Quality Performance

McNeal flour yield potential and test weight range meets industry requirements. McNeal is similar to five widely grown spring wheat varieties for both these traits (Table 7). Its average grain protein content is 13.8 percent for nurseries grown under irrigation (N=20) (Table 8) and 14.8 percent under dryland conditions (N=22) (Table 9). These values are similar to five of the leading spring wheat varieties grown over the past five years. Bread baking quality is measured by loaf volume and water absorption. These two traits are highly associated with protein content of the grain (Table 10). Industry desires adequate dough mixing properties for wheat flour available to bakery customers. McNeal will provide good quality and dough strength for the baking industry using Montana spring wheat varieties.

Table 6. Agronomic data of McNeal compared with five other hard red spring wheat varieties under Montana growing conditions

Variety	Approximate Heading Date[1]		Approximate Average Height (inches)		Lodging[2]	Shattering[2]
	I[3]	D[3]	I[3]	D[3]		
McNeal	6-28	6-27	36	31	R	R
Amidon	6-27	6-26	40	34	MR	R
Hi-Line	6-25	6-25	32	28	R	R
Lew	6-30	6-29	40	35	S	MR
Newana	6-30	6-28	33	30	R	R
Pondera	6-26	6-25	34	30	R	R

[1] Month - Day
[2] Legend: R = resistant, S = susceptible, M = moderately
[3] I = irrigated, D = dryland

Table 7. Quality characteristics of McNeal and five other hard red spring wheat varieties under Montana conditions.

Variety	Test Weight* (lb/bu)	Flour Yield (%)	Milling[1]	Baking[2]
McNeal	58.6	68.6	3	5
Amidon	59.7	70.2	5	5
Hi-Line	59.3	67.2	3	5
Lew	60.3	71.0	5	5
Newana	59.1	66.3	2-3	5
Pondera	60.0	68.7	3	5

[1, 2] Superior = 5; Inferior = 1
*Average of all samples for each variety tested.

Table 8. Percent grain protein of McNeal and five other hard red spring wheat varieties under irrigated conditions in Montana 1989-1993.

Variety	4 yrs Bozeman	4 yrs Sidney	5 yrs Huntley	5 yrs Kalispell	2 yrs Conrad	Average
McNeal	15.3	14.4	12.9	14.4	11.9	13.8
Amidon	15.6	14.4	13.2	14.1	11.4	13.7
Hi-Line	15.4	14.1	12.8	14.4	11.1	13.6
Lew	14.8	14.5	13.2	14.3	11.9	13.7
Newana	14.5	13.0	12.0	13.4	11.4	12.9
Pondera	15.0	14.0	13.1	13.4	11.5	13.4

Table 9. Percent grain protein of McNeal and five other hard red spring wheat varieties under dryland conditions in Montana 1989-1993.

Variety	3 yrs Bzmn	4 yrs Mccsn	3 yrs Cnrd	4 yrs Hvre	5 yrs Hntly	3 yrs Sdny	Avrge
McNeal	15.0	15.1	13.1	16.1	16.4	13.4	14.8
Amidon	15.1	14.5	13.4	15.8	16.1	14.3	14.9
Hi-Line	14.3	15.3	12.9	16.2	16.2	14.1	14.8
Lew	14.4	14.9	13.0	16.3	16.0	14.3	14.8
Newana	13.6	14.4	12.5	15.0	15.5	12.9	14.0
Pondera	13.7	15.6	12.8	16.0	16.3	13.7	14.7

Table 10. Milling, baking, other quality characteristics of McNeal and five other hard red spring wheat varieties.

		Farinograph[1]		Baking Data		
Variety	Flour Ash (%)	Water Absorption[2] (%)	Dough Stability[3] (minutes)	Wheat Protein (%)	Water Absorption[2] (%)	Loaf Volume (cc)
McNeal	.465	66.1	16.1	14.5	67.2	1008
Amidon	.476	66.0	11.0	14.5	66.6	971
Hi-Line	.462	65.9	11.5	14.5	67.1	1028
Lew	.471	63.0	17.4	14.5	64.4	986
Newana	.463	64.5	11.4	13.6	65.8	991
Pondera	.450	65.2	13.3	14.2	64.4	1011

[1] Machine for measuring physical dough mixing properties of wheat flour.
[2] Water absorption: The Farinograph water absorption value is the amount of water a flour dough requires to reach optimum dough development. Bake absorption is the amount of water a flour sample requires to make a dough for optimum baking responses.
[3] Dough stability describes the length of time a wheat flour may be mixed before it breaks down

McNeal Spring Wheat

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McNeal Spring Wheat

by

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'McNeal' (PI 574642) is a hard red spring wheat with superior yield potential, desirable plant height, acceptable protein levels, and good milling and baking quality. It was developed and released by the Montana Agricultural Experiment Station. McNeal is named in honor of Dr. F.H. McNeal, USDA/ARS spring wheat breeder, who served Montana for many years. Foundation seed of McNeal was released to certified seed producers in April 1995.

Origin and Development

McNeal was developed from the cross of RS 6880 with 'Glenman.' RS 6880 was used as a parent because of its high level of protein. McNeal was tested as MT 8849 in the single line row nursery in 1987. This line was evaluated from 1988 through 1994 for yield, test weight, agronomic characteristics, milling and baking qualities at the Montana Agricultural Experiment Station Research Centers and in off-station sites.

Agronomic Characteristics

McNeal is a hollow-stemmed variety with intermediate height. It has the semidwarf gene *Rht2* but is taller than 'Newana' and shorter than 'Fortuna' or 'Lew.' McNeal has an awned spike, brown chaff and tan straw. McNeal will normally have approximately 20 white spikes per acre, but under some climatic conditions this count will be higher. It has a mid-dense spike with spreading florets. The glumes are brown with some white on the outer edges of the lemma and palea. The kernels are red, ovate, and medium length with a short brush. The kernels have a medium crease with slightly rounded cheeks. Under Montana growing conditions McNeal is resistant to lodging.

Table 1. Disease and insect reaction of McNeal compared to five other hard red spring wheat varieties.[1]

Variety	Sawfly	Stripe Rust	Leaf Rust	Stem Rust	Septoria
McNeal	S	MS	MS	MR	R
Amidon	MR	S	R	R	MR
Hi-Line	S	S	S	R	S
Lew	R	R	R	R	MS
Newana	S	MR	S	R	MS
Pondera	S	MR	MR	R	MS

[1] Legend: R = resistant; S = susceptible; M = moderately

Disease and Insect Resistance

McNeal is moderately susceptible to leaf rust and stripe rust. It is moderately resistant to prevalent races of stem rust and wheat streak mosaic virus. McNeal is susceptible to the Russian wheat aphid and the wheat stem sawfly (Table 1).

Areas of Recommendation

McNeal is recommended for production in all irrigated and dryland areas in Montana, except where the wheat stem sawfly is known to be a problem.

Table 2. Yield of McNeal compared to five other hard red spring varieties under dryland conditions (1986-1994).

	Comparable yield average by location (60 lbs/bu)						
Variety	Bozeman	Conrad	Havre	Huntley	Moccasin	Sidney	Average
McNeal	60.1	54.2	36.3	42.2	39.6	44.4	46.1
Amidon	64.2	50.5	34.5	39.4	34.7	40.4	43.9
Hi-Line	62.7	52.2	32.7	41.3	37.4	34.8	43.5
Lew	60.1	48.8	29.5	36.0	30.3	36.4	40.2
Newana	65.7	49.5	32.0	38.2	37.5	40.4	43.9
Pondera	67.0	50.3	32.7	37.6	36.9	37.5	43.7

Table 3. Yield of McNeal compared to five other hard red spring wheat varieties under irrigation and high rainfall conditions (1986-1994).

	Comparable yield average by location (60 lbs/bu)			
Variety	Kalispell (high rainfall)	Huntley	Sidney	Average
McNeal	103.9	70.1	77.4	83.8
Amidon	102.4	73.5	70.2	82.0
Hi-Line	94.6	71.5	71.1	79.1
Lew	92.0	62.9	64.0	73.0
Newana	102.8	71.5	74.6	83.0
Pondera	99.5	71.5	71.9	81.0

Field Performance

McNeal yields five percent more grain than Newana, 'Amidon,' 'Hi-Line' or 'Pondera' on dryland on a statewide average. It yields 12 percent higher than Lew on dryland (Table 2). In irrigated plots the yield of McNeal was similar to Newana, Amidon, Hi-Line and Pondera, but 12 percent higher than Lew (Table 3). The test weight of McNeal under irrigation is similar to Amidon but less than the other varieties (Table 4). Under dryland conditions its test weight is relatively low compared to the other varieties (Table 5). McNeal heads earlier than Lew or Newana, but slightly later than Amidon, Hi-Line and Pondera. It is shorter than Amidon and Lew, but taller than Hi-Line, Newana and Pondera grown both under irrigation and dryland (Table 6).

Table 4. Test weight (lb/bu) of McNeal compared to five other hard red spring wheat varieties under irrigation and high rainfall conditions (1986-1994).

Variety	Kalispell (high rainfall)	Huntley	Sidney	Average
McNeal	59.5	58.1	61.3	59.6
Amidon	58.9	58.3	61.5	59.6
Hi-Line	59.1	60.5	61.5	60.4
Lew	60.5	61.2	62.2	61.3
Newana	59.1	59.5	61.6	60.1
Pondera	59.7	60.0	61.8	60.5

Table 5. Test weight (lb/bu) of McNeal compared to five other hard red spring varieties under dryland conditions (1986-1994)

Variety	Bozeman	Conrad	Havre	Huntley	Moccasin	Sidney	Average
McNeal	57.3	59.3	57.1	55.5	58.4	58.0	57.6
Amidon	58.8	59.9	57.5	57.7	58.4	58.5	58.5
Hi-Line	59.3	60.3	56.6	56.5	57.8	58.1	58.1
Lew	60.6	59.6	58.3	57.5	60.0	59.2	59.2
Newana	57.9	59.3	57.7	57.1	59.1	58.8	58.3
Pondera	60.2	60.8	58.8	57.3	59.7	59.2	59.3